

[1917]

## NIAGARA AT THE BATTLE FRONT

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**N**IAGARA FALLS, held in reverence for its beauty by generations of nature-loving Americans, has enlisted for the war and is doing its bit in the cause for which the people of the United States have pledged anew their lives, their fortunes, and their sacred honor.

Aided by science, it has transformed the silvery sheen of its whitened waters into the fateful furies of the artillery duel and the infantry charge. The placid flood of the upper river has become hardness in steel, speed in manufacture, healing in antiseptics, whiteness in linen, cheapness in automobiles, durability in machinery.

It has lengthened the lives of big guns; it has multiplied the power and the number of shells; it is standing guard over every mile of war-carrying railroad track, and is protecting every engine axle and car wheel from failure in the rush of material to the front. Aye, who knows but that the very scales of victory will be turned by the weight it throws into the balance?

The story of Niagara's rôle in the battle of the nations is an epic in the history of war.

Twenty-seven years ago certain manufacturers, seeing the tremendous amount of power running to waste where the waters of Superior, Michigan, Huron, and Erie leap from lake level toward sea-level, undertook the installation of a great hydro-electric plant at Niagara. Later other power-developing interests entered the field, and then began a legislative and diplomatic war between those who would utilize some of the power of Niagara and those who would keep it untouched by the unsentimental hand of commercialism.

Finally the governments of the United States and Canada made a treaty regulating the amount of water that could be diverted for power purposes. Canada has used her share to the last second-foot, but the United States has never permitted

the utilization of a considerable share of her allowance.

### A VAST ELECTRICAL LABORATORY

But for the part used there has been rendered by the users one of the most remarkable accounts of stewardship in the history of commercial progress. The cheap power obtained made Niagara a laboratory where great ideas could be transformed into nation-benefiting enterprises.

When Niagara power was first developed, efforts to make artificial grinding materials were proving a failure because of a lack of electric current at a price the new venture could afford to pay. Those who backed the process thereupon went to Niagara Falls, set up a plant, and founded the artificial abrasive industry. How much its success means to America cannot be overestimated.

Take the grinding machinery out of the automobile factories, remove it from the munition plants, eliminate it from the locomotive works, car foundries, and machine shops of the country and you would paralyze the nation's whole industrial system. And that would have happened ere now had not Niagara's artificial abrasives stepped in to save the day when the war shut out our natural supply of emery and corundum from Asia Minor.

There is not a bearing in your automobile but is ground on Niagara-made grindstones; crankshafts are roughened and finished with them, pistons and cylinders are made true, camshafts likewise, and a hundred critical parts of every car, whether of the cheapest or the most expensive make. It would be impossible to build anything of tool steel on a commercial basis without Niagara's abrasives.

### NIAGARA SHAPES AND HARDENS OUR SHELLS

No shell goes to Europe whose nose has not been ground into shape on Niagara-made grindstones. Likewise it is



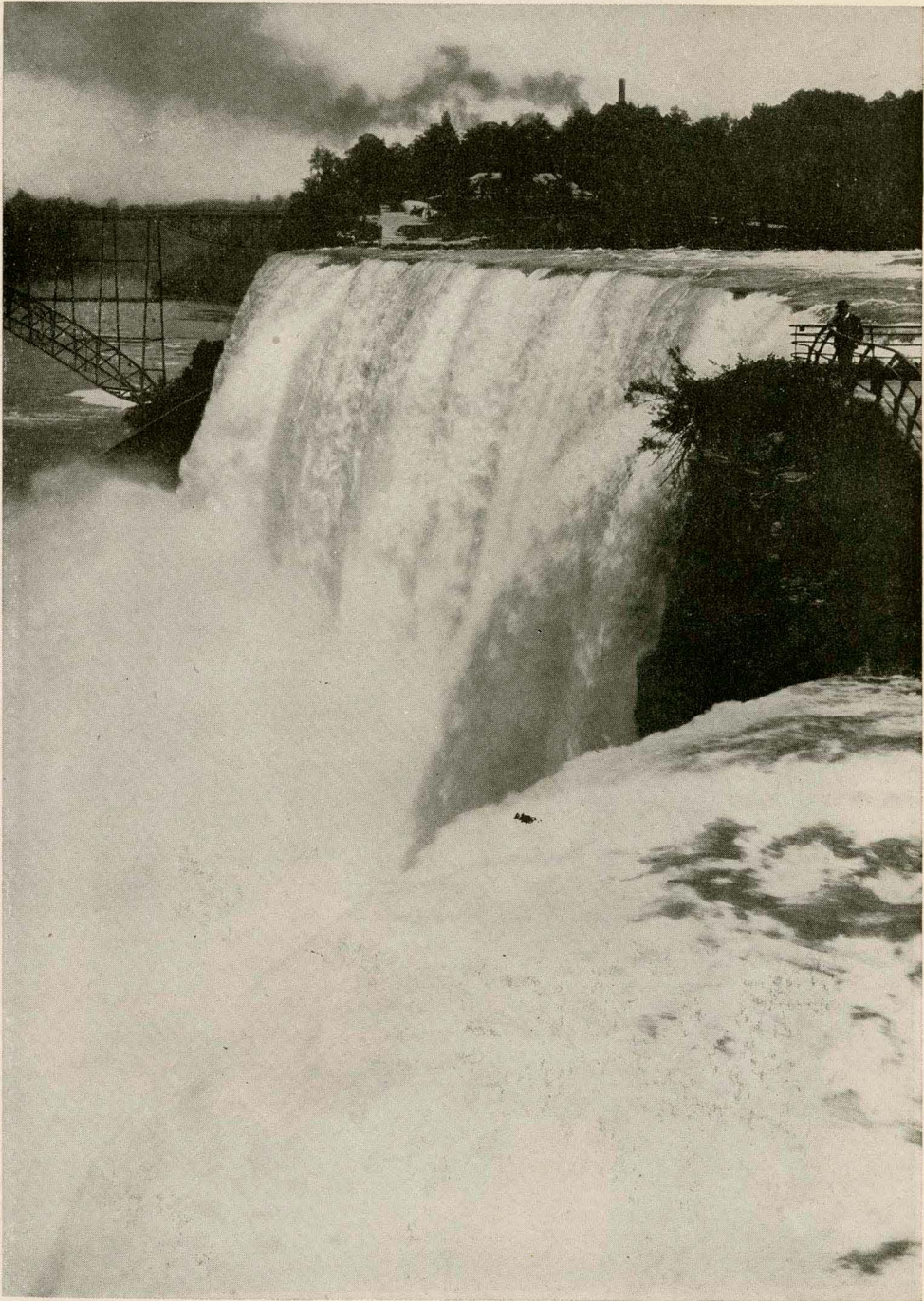


Photograph by Ernest Fox

#### HORSESHOE FALLS FROM GOAT ISLAND

The shimmering softness of the cataract has been transformed by a miracle of industry into a sure rock of defense. From the seemingly insecure wooden causeway shown to the left the spectator commands a wonderful panoramic view of the very heart of Niagara.





Photograph by Ernest Fox

AMERICAN FALLS FROM GOAT ISLAND

Directed by the magic of man's ingenuity, the resistless energy of these raging waters is transmuted into hardness in steel, speed in manufacture, healing in antiseptics, whiteness in linen, cheapness in automobiles, durability in machinery.



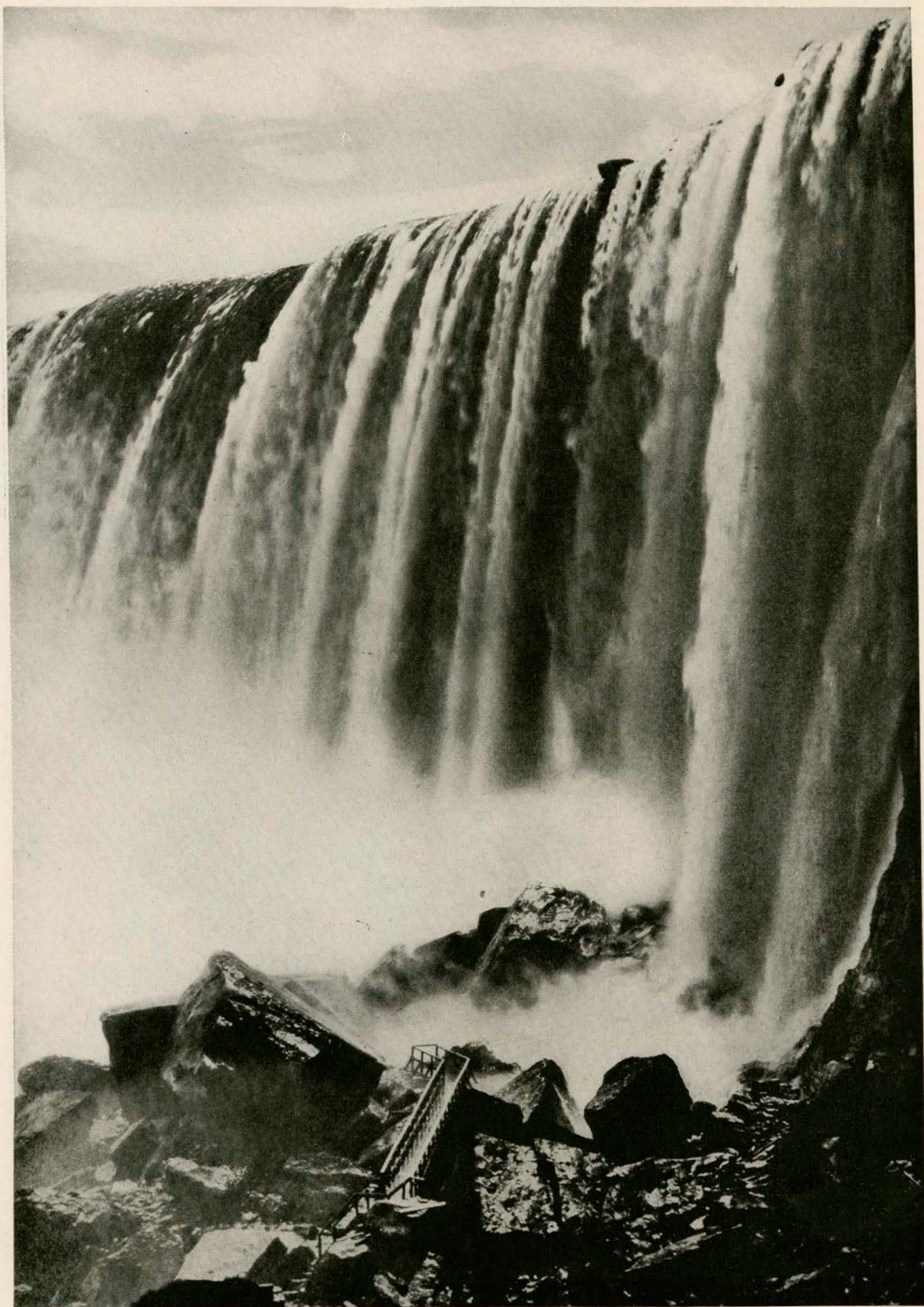


Photograph by Ernest Fox

THE AMERICAN FALLS IN THEIR PLUNGE OF 167 FEET

A modern Orpheus, science has lured the mighty waters of Niagara to follow it into the channels of utility, yet without sacrificing the beauty and grandeur of the world's noblest cataract.



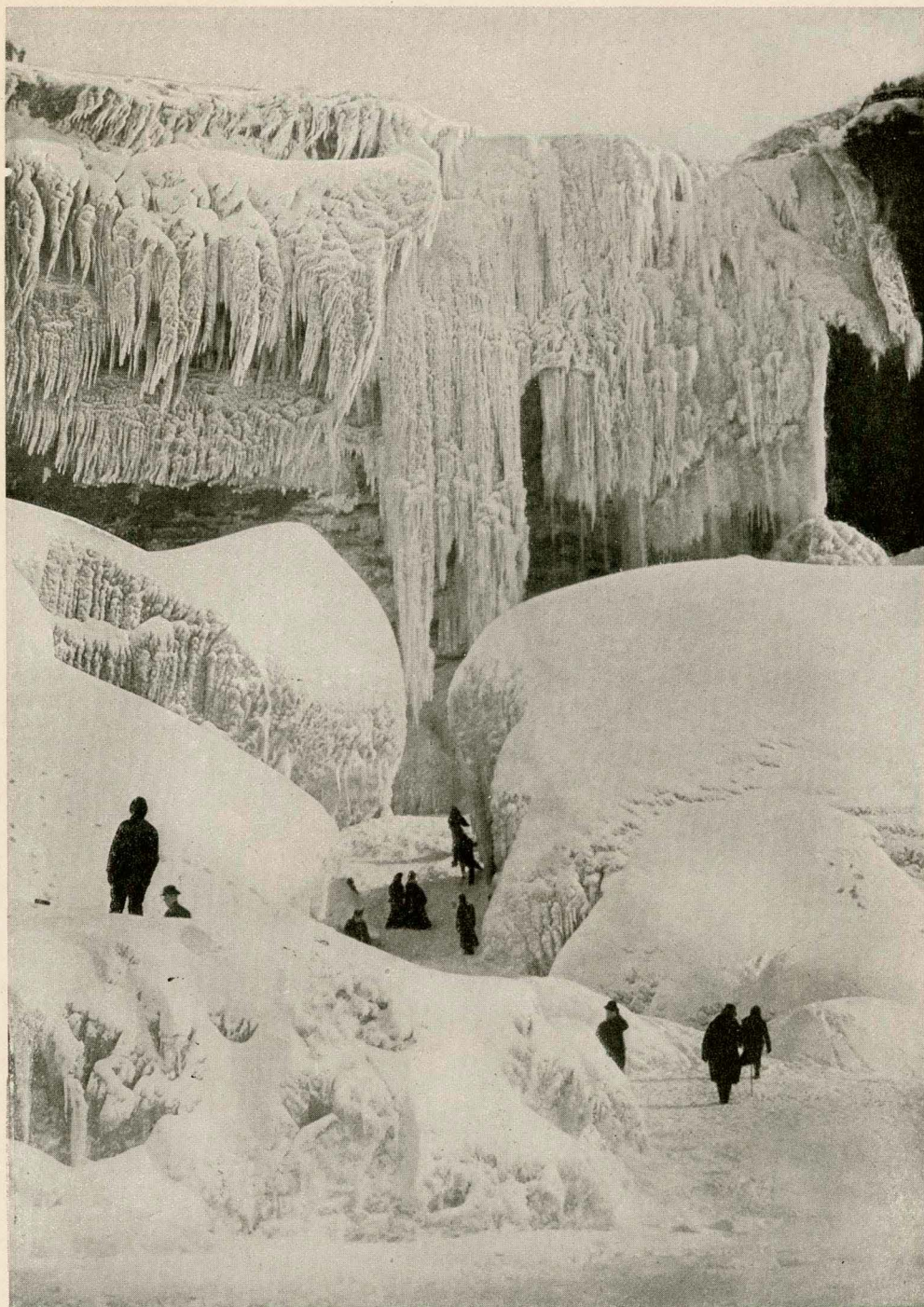


Photograph by Ernest Fox

#### HORSESHOE FALLS FROM THE CANADIAN SIDE

The ceaseless flow and measureless power of Niagara are symbolic of America's purpose and resources, which will be mobilized for service in the cause of humanity on the battlefields of Europe. No hand can stay the nation, no fleets or armies turn it from its goal—the emancipation of mankind from the tyranny of despots.





Photograph by Ernest Fox

#### NIAGARA'S CAVE OF THE WINDS

The Niagara that mantles itself in ice at the silent touch of the Frost King, in its turn touches sand and coke, and they become near-diamonds; water and salt, and they become purity in drinking water; clay, and it gives forth a marvelous metal; a dead wire, and it lights a city or drives a car; carbon and silica, and they are transformed into lubricants or inks.



Niagara's abrasives that have done more than any one other thing to master the "hot box," that *bête noire* of the American railroad man and the worst enemy of schedule-time train transportation the world around.

While the processes of carborundum manufacture were being perfected another lesson was learned. Quartz, you remember, is the geologist's thermometer, for it is formed between narrow ranges of temperature. If the materials from which Nature makes it are subjected to more than so much heat, they take on an entirely different character from quartz. The same is true if they are subjected to less than a certain amount of heat.

So, also, it is with carborundum. In its manufacture a large quantity of a mixture of coke and sand, with a touch of sawdust and a dash of salt, is put into an electric furnace. A heavy current of electricity is passed through this for 48 hours, heating it to 1,350 degrees centigrade.

If it is properly heated, there forms around the central core of coke a great array of crystals, large and small, almost as hard as diamonds. If too much heat is applied, instead of forming into crystals, the material breaks up into fine particles of black dust and you have graphite.

#### LEADS FOR PENCILS; ELECTRODES FOR FURNACES

Therefore, largely by the same process, the electric furnace produces from the same materials the near-diamond of the artificial grindstone and the microscopic dust that becomes lead for a pencil, color for ink, base for lubricants, electrodes for furnaces and death chairs, or a thousand other things, under the manipulations of industrial science.

In making carborundum wheels, whetstones, and other grinding implements, the crystals are separated, graded, mixed with various binders, pressed into the shapes desired, dried, and then baked in kilns, like porcelain or other ceramic products. In some cases binders are used which do not permit exposure to heat, as in the case of emery cloth.

Carborundum has a companion, aluminum, as an abrasive, each having its more advantageous uses. In the manufacture of the latter certain clays are used. One of these is bauxite. This is first purified and then put into a water-jacketed electric furnace, which fuses the aluminum oxide. The fused material is taken out, crushed, and prepared for use much after the manner of carborundum.

Between the two, Niagara has succeeded in saving American industry from the calamity that would otherwise have ensued as a result of the cutting off of our supply of natural abrasives. For more than two years Niagara's abrasive industry has been mobilized against the Central Powers with an effect that cannot be measured.

#### GIVING STEEL A GREATER HARDNESS

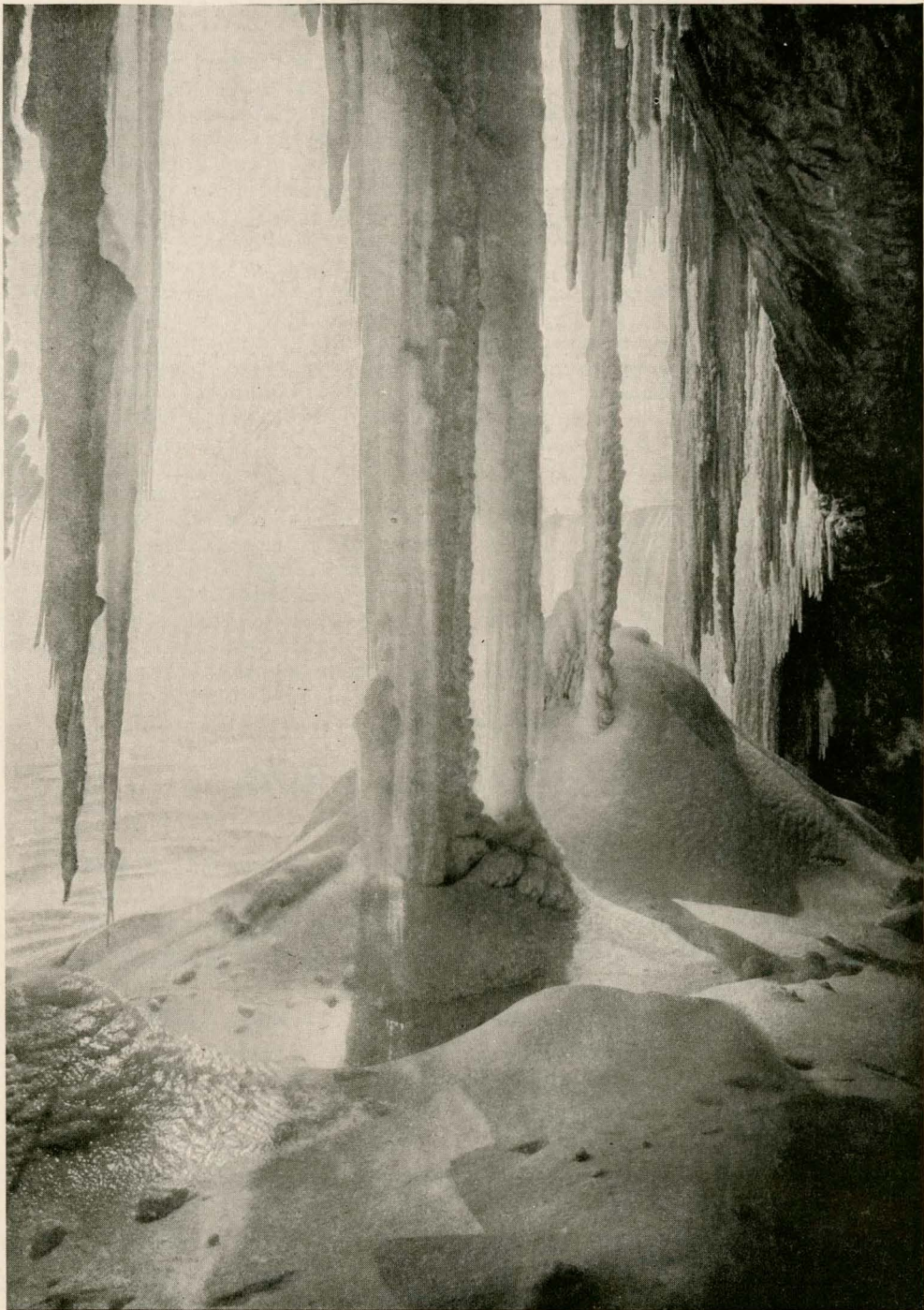
But Niagara's bit in behalf of American arms does not end with the story of abrasives; indeed, it only well begins. The story of ferro-silicon is another illustration of how beauty under the alchemy of science is transmuted into grim-visaged war.

Last year this country made more steel than the whole world produced when William McKinley became President of the United States. Nearly three-fourths of that steel was made by the open-hearth process, and ferro-silicon was used as a deoxidizer, to purify it by driving out the oxygen. Furthermore, in the making of big steel castings that alloy is practically indispensable in the elimination of blow-holes.

The entire ferro-silicon industry, practically, is centered at Niagara, which thus gives pure steel and sound castings as another part of America's contribution to the cause of Allied victory. Every contract for shell steel that has been made in two years calls for a content of ferro-silicon.

There is another alloy of iron indispensable in war, and well-nigh so in twentieth century peace — ferro-chromium. This is the alloy which gives that peculiar hardness to steel which makes it resistant almost beyond human conception. It has been estimated that a modern 14-inch shell, such as our Navy is ever





Photograph by Ernest Fox

ICICLES UNDER THE HORSESHOE FALLS: NIAGARA

When Nature desires an altar dedicated to her own glory she seeks Niagara in winter and there creates gigantic monoliths of ice and snow, carves them with her chisels of wind and water, quickens them with color snatched from a sunbeam, and lo! her worshipers come to gaze in silent adoration in the aisled and vaulted temple of her matchless handiwork.



cynamid, essential in the fixation of nitrogen, is obtained.

But Niagara does not stop with these things. In the trenches of Europe there must be pure water lest epidemic disease sweep over them, destroying more than the shells, shrapnel, and machine-guns of the enemy; and Niagara comes forward with chlorine, or an allied product, which kills the germs of disease, yet leaves the drinker untouched.

In the simplest form, the process of breaking up salt and getting command of the qualities of the two elements in it consists of dissolving about one part of common salt in eight parts of water and passing a given current of electricity through it. The resultant fluid is a great bleacher and disinfectant. A gallon of it will kill all the germs in a day's drinking water of a city like Washington. Of course, the processes of manufacturing chlorine, bleaching powder, and other compounds is more complex.

A thousand American cities sterilize

their water with these products, which have done more than any other agency in the hands of the sanitariums to wipe out water-borne epidemics. In the hospitals of France and England they form the active part of mixtures used to sterilize the wounds of the soldiers. Without them there would be no book or letter paper; cotton dresses and sheets would be no longer white; our every-day chemical fire extinguisher would disappear.

One might go on showing how Niagara aids America in her preparedness campaign. Its laboratories are producing the materials from which picric acid and other powerful explosives are made. They also are producing metallic soda from which is manufactured sodium cyanide, used alike in extracting gold and silver and in electro-plating.

All these things Niagara has been able to do without detracting at all from its beauty — even without exhausting the amount of water authorized by the Canadian-American treaty.

## HELP OUR RED CROSS



*THE RED CROSS needs at this time more than it ever needed before the comprehending support of the American people and all the facilities which could be placed at its disposal to perform its duties adequately and efficiently.*

*I believe that the American people perhaps hardly yet realize the sacrifices and sufferings that are before them.*

*We thought the scale of our Civil War was unprecedented, but in comparison with the struggle into which we have now entered the Civil War seems almost insignificant in its proportions, and in its expenditure of treasure and of blood. And, therefore, it is a matter of the greatest importance that we should at the outset see to it that the American Red Cross is equipped and prepared for the things that lie before it.*

*It will be our instrument to do the work of alleviation and of mercy which will attend this struggle.*

WOODROW WILSON.

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